

# ANNUAL REPORT FOR 2002



**Casey Tract Mitigation Site**  
**Currituck County**  
**Project No. 6.049001T**  
**TIP No. R-2228**



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## **SUMMARY**

The following report summarizes the monitoring activities that have occurred in the past year at the Casey Tract Mitigation Site. 2002 is the fifth year the vegetation has been monitored and the fourth year the site has been monitored for hydrologic success. The site must demonstrate both hydrologic and vegetation success for five years.

The Casey Tract contains one tidal gauge, one rain gauge and nine groundwater-monitoring gauges. The site also contains 3 vegetation monitoring transects.

Hydrologic monitoring indicated that of the nine gauges on site, all but two showed inundation or saturation within 12 inches of the surface for over 12.5% of the growing season. The two gauges that indicated saturation for less than 5% of the growing season are both located within reference areas. Two of the gauges showed saturation the entire growing season.

Vegetation monitoring was performed on the approximately 3.5 acres of marsh creation on this site. The vegetative marsh success of the wetland site is determined in accordance with NMFS Guidelines were not evaluated, and did not count to the final count of plots. 2002 represents the fifth year of vegetation monitoring; at this time, the percent frequency of the target specie is 73.3%, the scale value is 4.23, and the planted area is well within the 75% vegetative cover requirement.

Based on the monitoring results from the 2002 growing season, NCDOT recommends that the vegetation monitoring be discontinued. Hydrologic monitoring will continue for a fifth year.

## **1.0 INTRODUCTION**

### **1.1 Project Description**

The Casey Tract Mitigation Site is located in Currituck County (Figure 1) and is approximately 24 acres in size. Designed to mitigate for the widening of NC 168, the project includes the creation of coastal marsh wetland and the preservation of forested wetlands and forested upland areas.

The site was first monitored for vegetation in 1998. In August of 1998, NCDOT installed monitoring gauges to be used for hydrologic monitoring. The 2002 annual monitoring report includes the results of both hydrologic (fourth year) and vegetation (fifth year) monitoring of the site.

### **1.2 Purpose**

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for five consecutive years. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetative monitoring during 2002 at the Casey Tract Mitigation Site. Site and local climate conditions are analyzed in order to determine site success.

### **1.3 Project History**

November 1997	Site Constructed
January 1998	Site Planted
August 1998	Monitoring Gauges Installed
October 1998	Vegetation Monitoring (1 yr.)
March – November 1999	Hydrologic Monitoring (1 yr.)
October 1999	Vegetation Monitoring (2 yr.)
March – November 2000	Hydrologic Monitoring (2 yr.)
August 2000	Vegetation Monitoring (3 yr.)
December 2000	Open Water Area Delineated
March – November 2001	Hydrologic Monitoring (3 yr.)
July 2001	Vegetation Monitoring (4 yr.)
March – November 2002	Hydrologic Monitoring (4 yr.)
July 2002	Vegetation Monitoring (5 yr.)

## 1.4 Debit Ledger

**Table 1.** Casey Tract Debit Ledger

Mit. Plan				Ratios	TIP DEBIT
Currituck Co. Habitat	Acres at Start:	Acres Remaining			R-2228A, BA,BB*
FWM Creation	5.5	0	0.00		5.5
FWM Preservation	11.9	0	0.00		11.9
SPH	4	0	0.00		4
Upland Mgmt	2.4	0	0.00		2.4
<b>TOTAL</b>	<b>23.8</b>	<b>0</b>	<b>0.00</b>		

\*DCM No. 124-95, 139-94  
Corps Action ID No. 199504770  
DWQ No. 2937, 3016

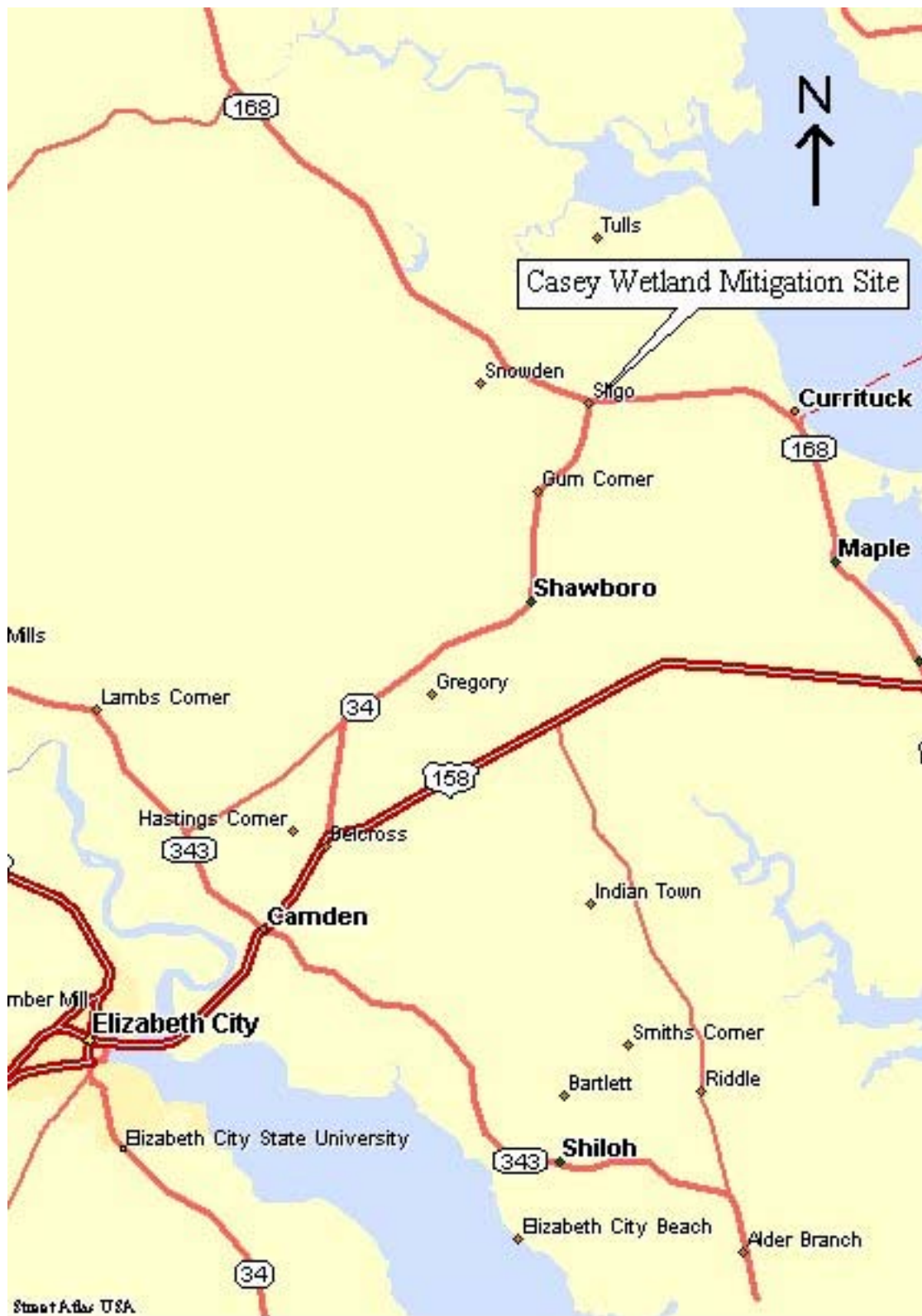


Figure 1. Site Location Map

## **2.0 HYDROLOGY**

### **2.1 Success Criteria**

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology states that the area must be inundated or saturated (within 12" of the surface) by surface or groundwater for at least a consecutive 12.5% of the growing season. Areas inundated for less than 5% of the growing season are always classified as non-wetlands. Areas inundated between 5% - 12.5% of the growing season can be classified as wetlands depending upon factors such as the presence of wetland vegetation and hydric soils.

The growing season in Currituck County begins March 20 and ends November 13. These dates correspond to a 50% probability that temperatures will drop to 28°F or lower after March 20 and before November 13.<sup>1</sup> The growing season lasts 239 days; therefore, optimum hydrology requires 12.5% of this season, or at least 29.88 consecutive days (rounded to 30 days). A consecutive 8% would be equivalent to 19.12 days (rounded to 19 days) and a consecutive 5% would be equivalent to 11.95 days (rounded to 12 days). Local climate must also represent average conditions for the area.

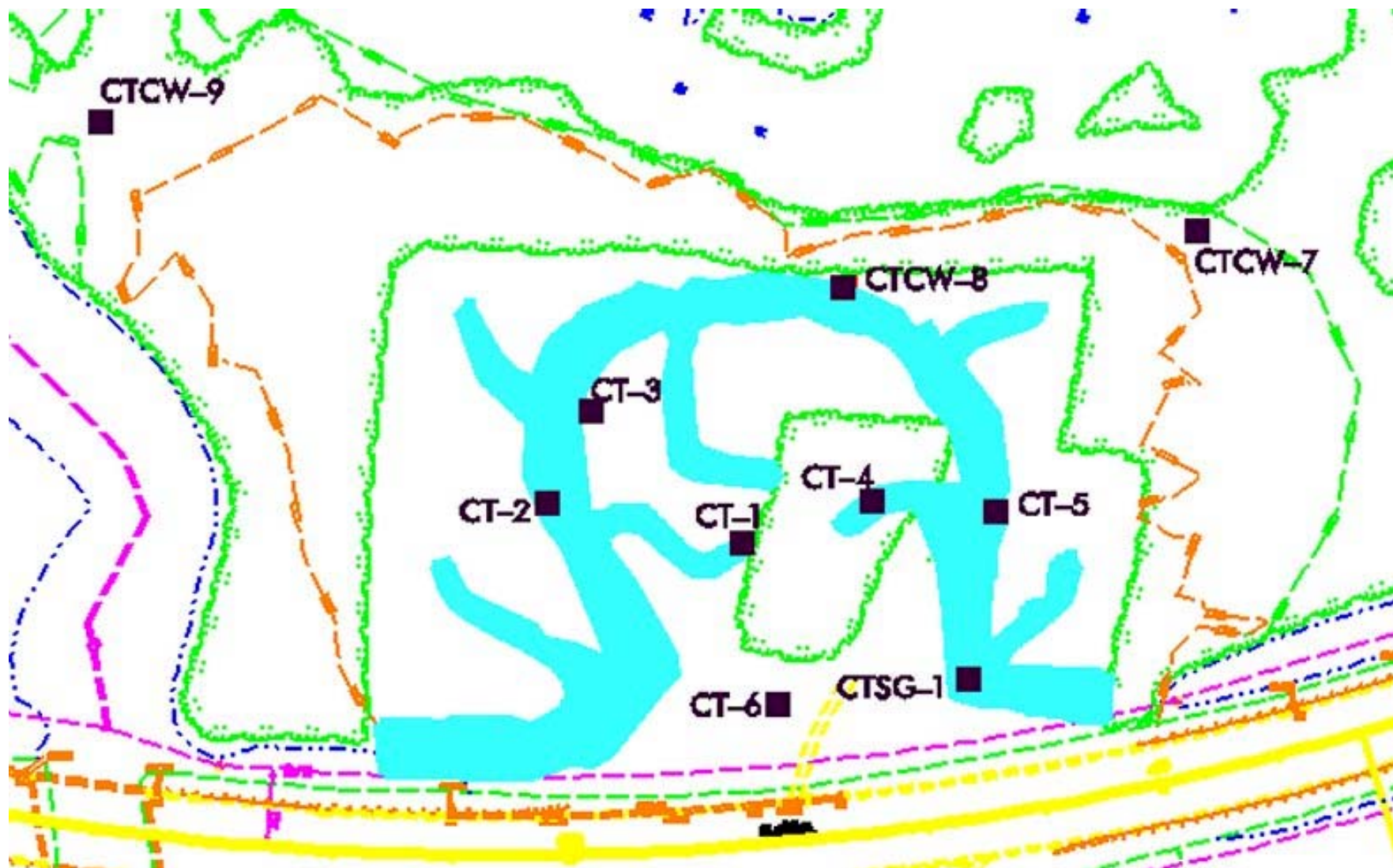
### **2.2 Hydrologic Description**

Nine groundwater-monitoring gauges, one rain gauge and one tidal gauge are located on the Casey Tract (Figure 2). Note that Figure 2 has been updated since the 2001 annual report. In August 2000, the original rain gauge was replaced with an Infinity rain gauge to ensure more accurate readings. The automatic monitoring gauges record daily readings of groundwater depth. Four of the groundwater-monitoring gauges are located within the reference wetland onsite.

The Casey Tract site was constructed both by grading the site to meet existing wetland elevations as well as by constructing a series of channels to allow for tidal flushing of the site. Thus, surface water should be prevalent in some areas of the site. Because areas of the site are dominated by surface water input, three of the original groundwater monitoring gauges (CT-2, 3, and 5) were placed with half of the gauge below the ground surface and half of the gauge above ground. Though these three gauges are monitored for the percent of the season in which saturation is shown, they are primarily used to monitor the surface water depth along the channel network.

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<sup>1</sup> Natural Resources Conservation Service, Soil Survey of Currituck County, North Carolina, p.71.



**Figure 2.** Monitoring Gauge Map (Note that map has been updated since the 2001 annual report.)



## 2.3 Results of Hydrologic Monitoring

### 2.3.1 Site Data

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each gauge. This number was converted into a percentage of the 239-day growing season. The results are presented in Table 2. Appendix A contains a plot of the groundwater depth for each monitoring gauge and the surface water depth recorded by the surface gauges. The maximum number of consecutive days is noted on each graph. The individual precipitation events, shown on the monitoring well graphs as bars, represent data collected from the onsite rain gauge. On the graphs of the gauges used to record both surface and groundwater (those placed both above and below ground surface), the ground surface elevation is given.

**Table 2.** 2002 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5% - 8%	8% - 12.5%	12.5%	Actual %	Success Dates
CT-1				✓	53.6	July 9-November 13
CT-2 (S)				✓	100.0	March 20- November 13
CT-3 (S)				✓	100.0	March 20-November 13
CT-4				✓	39.3	August 12-November 13
CT-5 (S)				✓	76.2	May 16- November 13
CTCW-6	✓				0.42 (1 day)	
CTCW-7				✓	38.9	August 13-November 13
CTCW-8	✓				3.4	
CTCW-9				✓	38.9	August 13-November 13

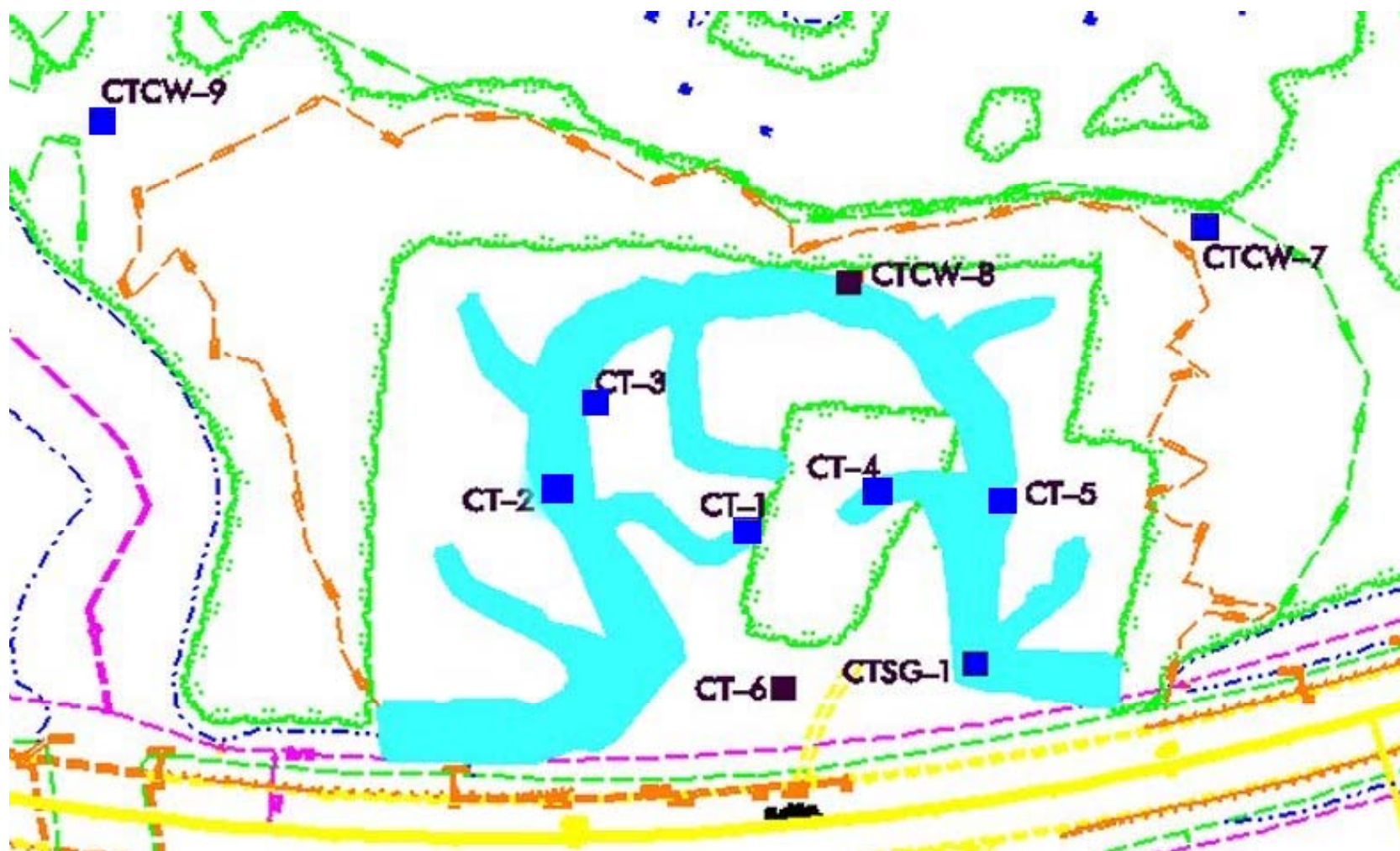
**Notes:** 'S' refers to combined surface water/ groundwater monitoring gauges.  
'CTCW' refers to gauges in reference areas.

Figure 3 is a graphical representation of the hydrologic monitoring results: gauges marked in blue represent saturation for more than 12.5% of the season, red dictates success between 8 and 12.5%, green between 5 and 8%, and black indicates less than 5%.

Specific gauge problems encountered during 2002 are listed below. However, these problems did not affect the overall hydrologic success of the site.

- CT-4 and CTCW-9 experienced gauge malfunction (February 5-April 9) and did not record data.
- CT-5 stopped recording data on 4/8/02. The gauge was replaced and programmed to record data starting on 5/16/02. The gauge showed saturation or inundation for the remainder of the growing season.

The surface gauge CTSG-1 has shown consistent surface water throughout the growing season. Only two gauges did not meet jurisdictional success for the 2002 growing season.



**Figure 3.** 2002 Hydrologic Monitoring Results

### **2.3.2 Climatic Data**

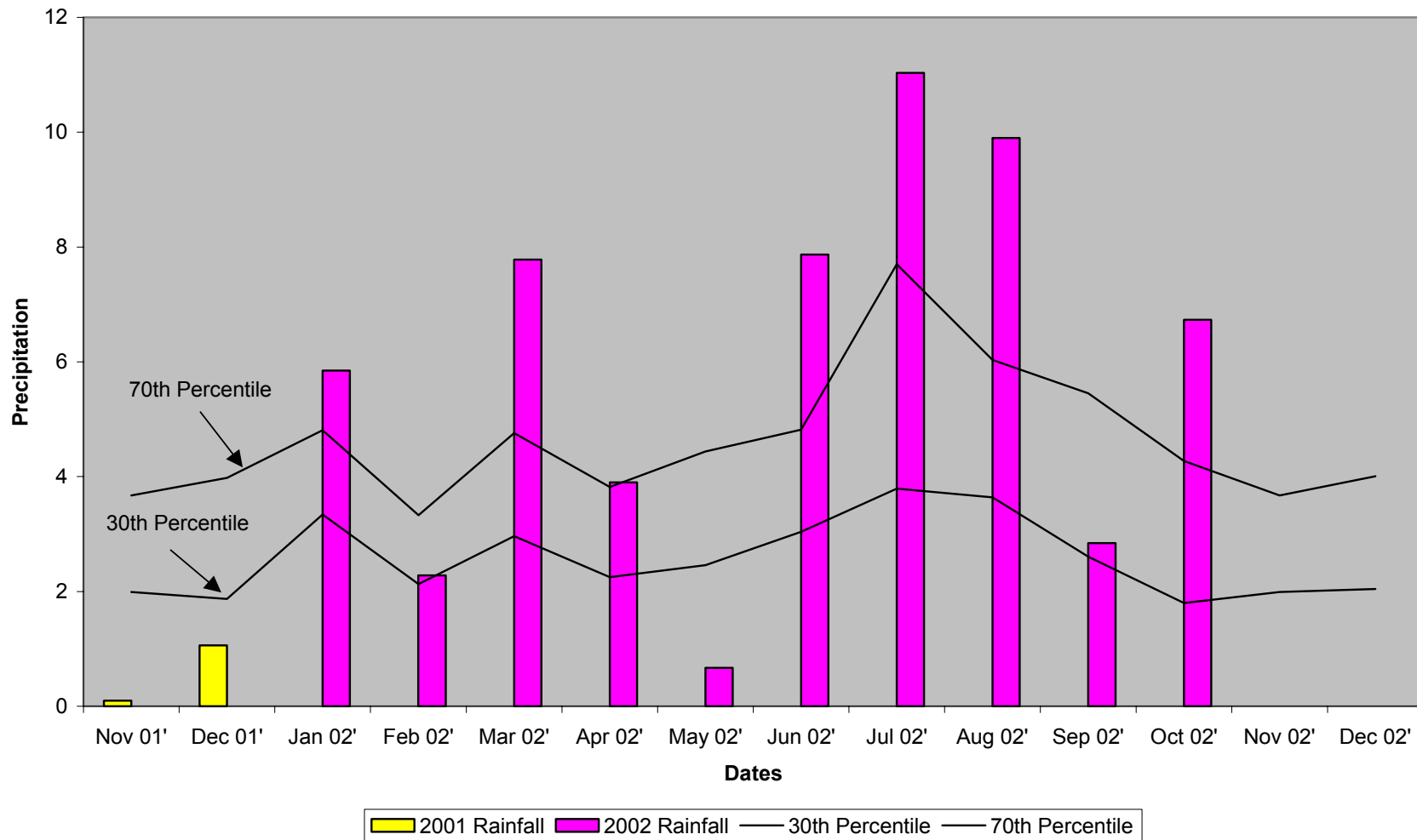
Figure 4 is a comparison of monthly rainfall for the period of November 2001 through October 2002 to historical precipitation (collected between 1971 and 2002) for Elizabeth City, North Carolina. This comparison gives an indication of how 2002 relates to historical data in terms of climate conditions. The NC State Climate Office provided all historical local rainfall data.

According to the Elizabeth City gauge, February and May experienced below average rainfall. The months of April and September all recorded average rainfall for the site. January, March, June, July, August, and October experienced above average rainfall. No data is currently available for November or December 2002, but it will be provided in the 2003 annual report.

### **2.4 Conclusions**

2002 represents the fourth full growing season that the hydrologic data has been examined. Only two of the groundwater monitoring gauges did not show jurisdictional criteria had been met. The surface gauge recorded consistent surface water throughout the growing season, and the three gauges that are placed half below the ground surface and half above it showed saturation or inundation for the full growing season (it is believed that CT-5 would have shown saturation the entire season had it not been malfunctioning early in the season). Based on these results, NCDOT recommends that hydrologic monitoring continue onsite for another year.

**Casey 30-70 Percentile Graph 2002**  
**Elizabeth City, NC**



**Figure 4. 30-70 Percentile Graph**

### **3.0 VEGETATION**

#### **3.1 Success Criteria**

The vegetative marsh success of the wetland site will be determined in accordance with NMFS Guidelines. Monitoring plots found to be located within the open water channel will not be evaluated, and will not count toward the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met.

1. At year five, the average of all plots should have a scale value of 5 (75% vegetative cover) consisting of wetland herbaceous species, not including any invasive species.
2. A minimum of 70% of the plots shall contain the target (planted) species.

#### **3.2 Description of Species**

The following marsh grass species were planted in the Wetland Restoration Area:

##### **Zone 1: (0.63 acres)**

*Juncus effusus*, Common Rush  
*Scirpus cyperinus*, Woolgrass

##### **Zone 2: (2.83 acres)**

*Cladium jamaicense*, Saw Grass  
*Spartina cynosuroides*, Big Cordgrass

### 3.3 Results of Vegetation Monitoring

	Plot #	Scale Factor	<i>Juncus effusus</i>	<i>Scirpus cyperinus</i>	<i>Cladium jamaicense</i>	<i>Spartina cynosuroides</i>	Frequency	Notes
	1	3.0						<i>Juncus roemerianus</i> , <i>Aster</i> sp., <i>Cyperus</i> sp.
	2	5.0		✓	✓		✓	Smartweed, Wisteria
	3	4.0			✓		✓	<i>Juncus roemerianus</i> , <i>Aster</i> sp., <i>Cyperus</i> sp., Smartweed
	4	2.0			✓		✓	<i>Juncus roemerianus</i> , Smartweed
	5	5.0		✓	✓		✓	Smartweed, Lizard Tail
	6							out of bounds
	7							out of bounds
	8	5.0	✓		✓		✓	Wisteria
	9	5.0			✓		✓	
	10	2.0						Smartweed, <i>Juncus</i> sp.
	11							open water
	12							open water
	13							open water
	14							open water
	15	5.0			✓		✓	Broomsedge, Partridge Pea, Pennywort
	16	5.0						Redtop Panicum, Lezpedeza, Dog fennel
	17							open water
	18	4.0			✓		✓	Phragmites, <i>Aster</i> sp., <i>Pluchea</i> sp.
	19							open water
	20	3.0			✓		✓	<i>Pluchea</i> sp., Smartweed, <i>Aster</i> sp., Pennywort
	21	3.0						Wooly Panicum, Broomsedge
	22							open water
	23	5.0			✓		✓	<i>Juncus</i> sp., Pennywort, <i>Scirpus</i> sp.
	24							open water
	25	5.0		✓	✓		✓	Smartweed, Lizard Tail
	26							open water
	27	5.0		✓	✓		✓	Lizardtail, Smartweed
	28							open water
	29	3.0						Pennywort, <i>Juncus R.</i> , Smartweed, Pickleweed
	30							open water
	31							open water
	32							open water
	33							open water
	34	5.0						<i>Aster</i> sp., Smartweed
	35	5.0			✓		✓	Briars, Wisteria
	36	5.0			✓		✓	Pennywort
	37	3.0		✓	✓		✓	Smartweed, Lizard Tail
	38	2.0			✓		✓	<i>Aster</i> sp., Smartweed, <i>Scirpus</i> sp.
	39	5.0		✓			✓	<i>Polygonum</i> sp., <i>Aster</i> sp., <i>Cyperus</i> sp.
	40	3.0	✓				✓	Pennywort, <i>Typha</i> sp., <i>Polygonum</i> sp.
	41	4.0						<i>Typha</i> sp., <i>Polygonum</i> sp.
	42	5.0		✓			✓	Pennywort, <i>Typha</i> sp., <i>Polygonum</i> sp.
	43	5.0						<i>Cyperus</i> sp., <i>Juncus R.</i>
	44	5.0		✓			✓	<i>Polygonum</i> sp., <i>Ludwigia</i> sp.
	45	3.0						<i>Cyperus</i> sp., Pennywort, <i>Polygonum</i> sp., <i>Carex</i> sp.

	Plot #	Scale Factor	<i>Juncus effusus</i>	<i>Scirpus cyperinus</i>	<i>Cladium jamaicense</i>	<i>Spartina cynosuroides</i>	Frequency	Notes
	46							open water
	47							open water
	48	5.0	✓				✓	<i>Polygonum</i> sp.
	49	5.0	✓		✓		✓	Pennwort, <i>Cyperus</i> sp., <i>Polygonum</i> sp.
	50	5.0	✓				✓	Black willow, <i>Juncus</i> sp., Goldenrod
	51	3.0			✓		✓	<i>Centella</i> sp., Pennwort, <i>Juncus</i> R.
	52	5.0	✓				✓	<i>Cyperus</i> sp., <i>Polygonum</i> sp., <i>Cyperus</i> sp., <i>Polygonum</i> sp., Pennwort
	53	5.0		✓			✓	Pennwort, <i>Pluchea</i> sp., <i>Polygonum</i> sp.
	54	5.0						Pennwort, <i>Juncus</i> R., <i>Polygonum</i> sp.
	55	5.0	✓				✓	<i>Polygonum</i> sp., <i>Juncus</i> R.
	56	5.0			✓		✓	Pennwort, <i>Polygonum</i> sp., <i>Phragmites</i>
	57							open water
	58							open water
	59	5.0						<i>Phragmites</i> , Red maple, Poison ivy, <i>Juncus</i> C.
	60	5.0			✓		✓	<i>Phragmites</i> , <i>Hydrocotyle</i> sp., <i>Polygonum</i> sp.
	61	4.0	✓	✓			✓	Goldenrod, Red maple, Black willow
	62	5.0	✓				✓	<i>Cyperus</i> sp., <i>Aster</i> sp., Pennwort, <i>Polygonum</i> sp.
	63	5.0	✓				✓	<i>Aster</i> sp., <i>Pluchea</i> sp., Pennwort, <i>Cyperus</i> sp.
	64	5.0						Woolgrass, <i>Polygonum</i> sp., Pennwort
	65	5.0	✓				✓	<i>Aster</i> sp., <i>Pluchea</i> sp., Pennwort, <i>Cyperus</i> sp.
	66	5.0	✓	✓			✓	Pennwort, <i>Hydrocotyle</i> sp.
	67	5.0	✓				✓	<i>Cyperus</i> sp., <i>Aster</i> sp., Pennwort, <i>Polygonum</i> sp.
	68	4.0			✓		✓	<i>Polygonum</i> sp.
	69	5.0		✓			✓	Pennwort, <i>Polygonum</i> sp., <i>Aster</i> sp.
	70	5.0	✓				✓	<i>Juncus</i> sp., <i>Polygonum</i> sp., <i>Aster</i> sp., <i>Cyperus</i> sp.
	71	5.0						Pennwort, <i>Aster</i> sp., <i>Hydrocotyle</i> sp.
	72	4.0						<i>Juncus</i> R., Pennwort, <i>Polygonum</i> sp., <i>Aster</i> sp., <i>Cyperus</i> sp.
	73	4.0						Pennwort, <i>Aster</i> sp., <i>Hydrocotyle</i> sp., <i>Phragmites</i> , <i>Polygonum</i> sp.
	74	5.0	✓				✓	Pennwort, Red maple, <i>Polygonum</i> sp., <i>Panicum</i> sp.
	75	2.0						<i>Juncus repens</i> , <i>Polygonum</i> sp., <i>Panicum</i> sp.
	76	5.0			✓		✓	Pennwort, Red maple, <i>Polygonum</i> sp.
	77	5.0		✓			✓	<i>Typha</i> sp., Pennwort, <i>Polygonum</i> sp.
	78	5.0	✓				✓	Black willow, <i>Juncus</i> sp., Goldenrod
	79	5.0	✓				✓	Goldenrod, Pine, Pennwort, <i>Panicum</i> sp., <i>Polygonum</i> sp.
	80	4.0	✓	✓			✓	Red maple, Goldenrod, Pennwort
Frequency/Percentage of			30.0%	23.3%	36.3%	0.0%	73.3%	
Plots with Desired Species								
Sum Scale Value							254	
Total Number of Plots Counted							60	
Vegetative Cover (Scale Value)							4.23	

**Site Notes:** Marsh grasses present throughout the site.

### **3.4 Conclusions**

Approximately 3.5 acres of this site involved marsh grass plantings. The 2002 monitoring revealed that the site has a percent frequency of 73.3% and a scale value of 4.23. The percent frequency of target species is above the 70% requirement. The planted area is well within the 75% vegetative cover requirement.

NCDOT proposes to discontinue vegetation monitoring at the Casey Mitigation Site.



#### **4.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS**

In the fourth full year of hydrologic monitoring, all but two of the monitoring gauges indicated saturation for more than 12.5% of the growing season. Based on data from an Elizabeth City rainfall gauge, the area received higher than normal rainfall amounts in six of the last 12 months. Vegetation monitoring yielded a percent frequency of target specie of 73.3%.

NCDOT proposes to continue hydrologic monitoring for the fifth year. Because of the apparent vegetation success, NCDOT proposes to discontinue the vegetation monitoring for the Casey Mitigation site.

**APPENDIX A**

**DEPTH TO GROUNDWATER PLOTS**

## **APPENDIX B**

### **SITE PHOTOS AND VEGETATION PLOT LOCATIONS**





Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6





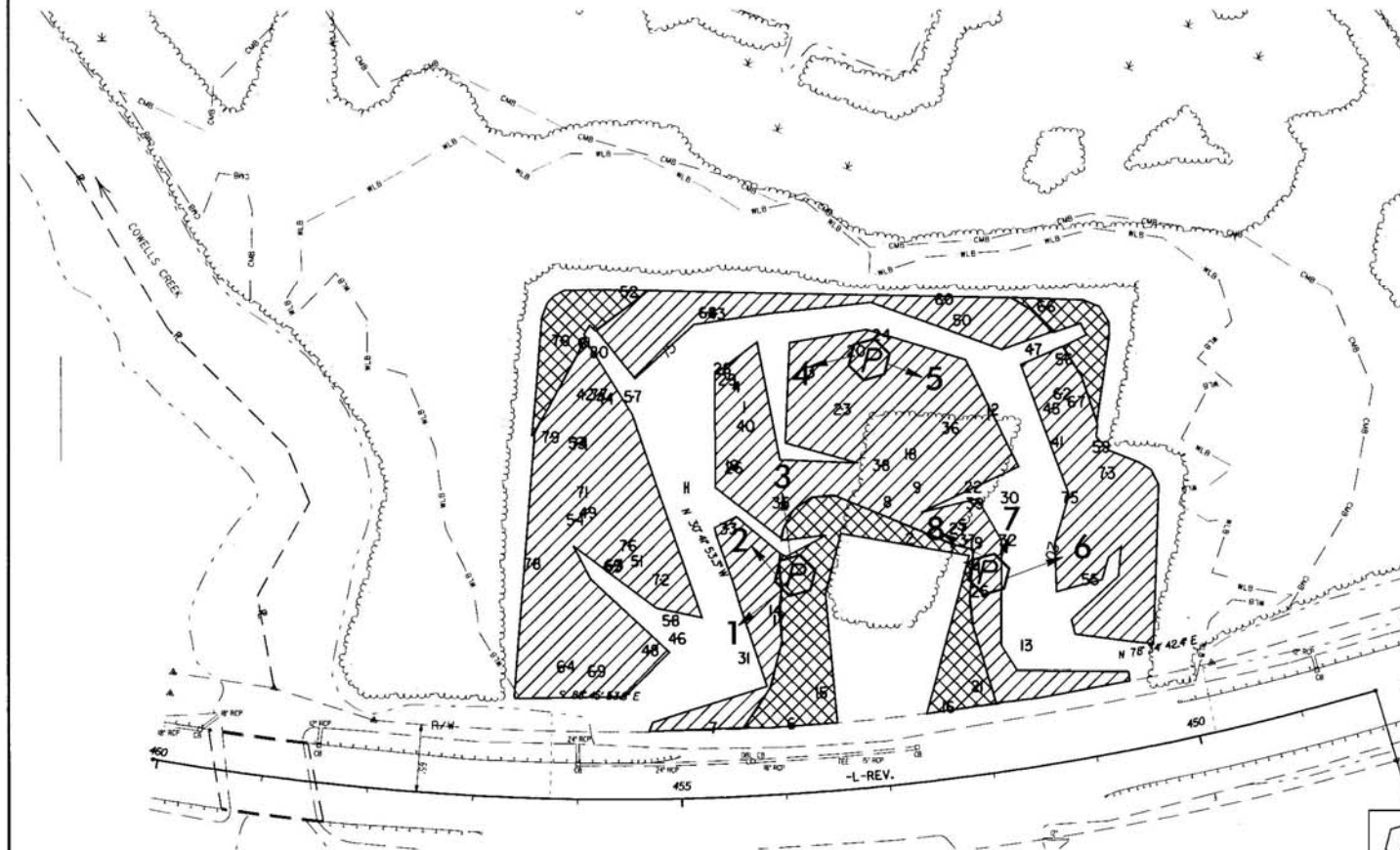
Photo 7



Photo 8

# Casey Wetland Mitigation Site Photo, Random Plot Locations, and Planting Plan

PROJECT REFERENCE NO.	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



Wetland Planting Plan	
	Zone 1:
	Common Rush ( <i>Juncus Effusus</i> )
	Woodgrass ( <i>Scleropogon</i> )
	Zone 2:
	Sawgrass ( <i>Cladium Juncifolium</i> )
	Giant Cordgrass ( <i>Spartina Cynosuroides</i> )

	Photo Locations
	Random Plot Locations